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The Effect of Zinc Supplementation on Expressed Levels of Peroxisome Proliferator-Activated Receptor Gamma and Glucose Transporter Type 1 Genes in Newborns of Women with Gestational Diabetes Mellitus

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Abstract The current study was designed to determine the beneficial effects of zinc supplementation on expressed levels of peroxisome proliferator-activated receptor gamma (PPAR-γ) and glucose transporter type 1 (GLUT1) genes in newborns of women with gestational diabetes mellitus (GDM). This randomized, double-blind, placebo-controlled clinical trial was performed among 40 women with GDM. Patients were randomly allocated to intake either 233 mg zinc gluconate (containing 30 mg zinc) ($n = 20$) or a placebo ($n = 20$) for 6 weeks. PPAR-γ and GLUT1 mRNA levels were quantified in umbilical cord blood of newborns of women with GDM. After 6 weeks of intervention, the change in serum zinc levels was greater in women consuming zinc than in the placebo group ($+11.1 \pm 13.4$ vs. -4.8 ± 17.3 mg/dL, $P = 0.002$). Quantitative results of RT-PCR demonstrated that compared with the placebo, zinc supplementation resulted in a significant increase of expressed levels of PPAR-γ mRNA ($P < 0.001$) and GLUT1 mRNA ($P < 0.001$) in umbilical cord blood of newborns of women with GDM. Taken together, the current study demonstrated that zinc supplementation for 6 weeks among GDM women increased the mRNA levels of PPAR-γ and GLUT1 in their newborns compared with the placebo group.

Keywords Zinc · Supplementation · Gestational diabetes · Peroxisome proliferator-activated receptor gamma · Glucose transporter type 1

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Introduction

Gestational diabetes mellitus (GDM) is defined as insulin resistance or carbohydrate intolerance causing hyperglycemia with onset or first recognition at any time during pregnancy [1]. GDM associated with several maternal complications including preeclampsia, still birth, and requiring operative vaginal delivery or cesarean section, as well as several fetal complications such as prematurity, neonatal hypoglycemia, respiratory distress syndrome and hyperbilirubinemia [2]. In addition, hyperglycemia and altered concentration of fatty acid derivates may result in decreased expression of peroxisome proliferator-activated receptor gamma (PPAR-γ) in the syncytiotrophoblast and the extravillous trophoblast of GDM placentas [3]. Previous studies

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